REMARKS

In the outstanding Office Action, claim 32 was rejected under 35 U.S.C. §101, as being directed to non-statutory subject matter. Claims 25-35 were rejected under 35 U.S.C. §103(a) over SATO (U.S. Patent No. 5,956,328), in view of Applicant's disclosed prior art.

Initially, Applicant would like to thank the Examiner for her courtesy in conducting a telephone interview with Applicant's representative, Joshua M. Povsner, on December 15, 2008. In the telephone interview, the Examiner invited Applicant to explain, in a Response to the outstanding Office Action, how signals SRI and SRQ in the embodiment of Figure 4A in the specification of the above-captioned patent application, differ in comparison to Applicant's disclosed prior art shown in Figure 4B. The Examiner also requested that Applicant explain how signals SRI and SRQ differ in the two figures due to placement of the amplitude adjuster in Figure 4A between a sign inverter and phase offsetter. In this regard, the Examiner suggested that Applicant clarify the meaning of the signals SRI and SRQ in Figure 4B of the present application, and explain how SRI and SRQ are obtained in Figure 4A. Finally, the Examiner suggested that Applicant explain how varying the placement of the amplitude adjuster effects the output signals RI and RQ shown in Figure 4A and 4B. Applicant traverses the outstanding rejections, and below provides explanations as requested by the Examiner.

Applicant traverses the rejection under 35 U.S.C. §101. In this regard, claim 32 recites:

A transmit diversity method that implements closed loop transmit diversity for controlling a phase and amplitude of a transmission signal from a transmitter based on a message from a receiver that receives the transmission signal from the transmitter, comprising: inverting a sign of a QPSK modulation signal to obtain a first phase offset of a multiple of 90°; adjusting an amplitude of the QPSK modulation signal after the sign inversion; and calculating a second phase offset smaller than 90° with the QPSK modulation signal after the amplitude adjusting.

The Office Action asserts that claim 32 is not directed to a statutory class of invention. However, claim 32 recites a "method", that is explicitly recognized as a statutory class as a "process". Further, the guidance provided to the Examiner as cited in the Office Action is moot in view of the subsequent decision in *In re Bilski*, and it is believed that claim 32 meets all requirements for a method under 35 U.S.C. §101 as set forth in *In re Bilski*. Accordingly, reconsideration and withdrawal of the rejection of claim 32 under 35 U.S.C. §101 is respectfully requested.

Applicant also traverses the rejection under 35 U.S.C. §103. As generally illustrated in Figure 7 of the present application, features of the present invention include offset processing in 45° units between -135° and 45°. Offset processing is provided in Figure 7 by switching on and off between offset processing in 90° units in Sign Inverter 60 and offset processing in 45° units in 45° Phase Shifters 63 and 64.

Furthermore, features of the present invention also include performing amplitude multiplication processing in Amplitude Adjuster 61 with respect to the output of Sign Inverter 60, before performing 45° offset processing in 45° Phase Shifters 63 and 64.

As set forth above, amplitude multiplication processing by Amplitude Adjuster 61 is performed after offset processing in 90° units is performed by Sign Inverter 60, and before performing 45° offset processing by the 45° Phase Shifters 63 and 64. **As a practical matter, prior to amplitude multiplication processing, information (i.e. IQ data) is represented with two bits, which is sufficient to identify where in the four quadrants in QPSK IQ data lies. However, two bits of information is not enough to represent the positions after 45° offset processing because more than four possible values exist. Consequently, prior to 45° offset processing, it is necessary to perform amplitude multiplication with respect to IQ data and**

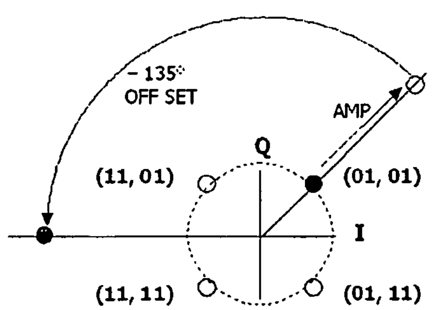
increase the significant figures. Afterwards, by performing a √2 calculation (and by rounding the fractions), it becomes possible to represent the positions of IQ symbol points with applied 45° offset. On the other hand, offset processing in 90° units can be applied to two-bit information prior to amplitude multiplication.

As a simple comparison, the following illustrations graphically explain differences in offset processing according to the embodiment of the claimed invention shown in Figure 4A and detailed in Figure 7, in comparison to the prior art shown in Figure 4B (note: the functional differences can be seen by following the directional arrows). As can be seen, simply switching on and off between offset processing in 90° units by changing the signs of symbol points in Sign Inverter 60 and offset processing in 45° units in 45° Phase Shifters requires only one √2 calculation, whereas the Prior Art offset processing requires multiple such √2 calculations.

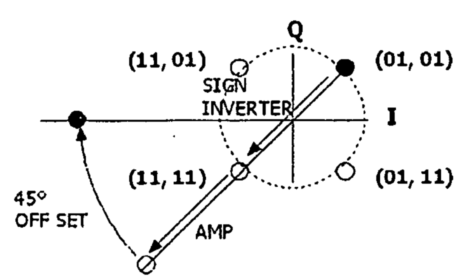
Prior art **(I, Q) →** **1. Amplitude Multiplication →**
2. -135° Offset

This invention **(I, Q) →** **1. 180° Offset (Sign Inverter) →**
2. Amplitude Multiplication →
3. +45° Offset (on/off)

PRIOR ART (FIG.4B)



THIS INVENTION (FIG.4A)



The following tables show the differences in data to be represented in processing. The exemplary data for IQ symbol points are explained in tables as follows for the claimed invention in comparison to the prior art shown in Figure 4B:

▼FIG. 4A

INPUT (SCI, SCQ)	OFF SET VALUE	SIGN INVERTER (SRI, SRQ)		AMPLITUDE MULTIPLICATION (AI,	QI)	45°STEP PROCESSING (√2) on/off (RI,	RQ)
(01, 01)	+180	(11, 01)	(+180°)	SRI * AMP	SRQ * AMP	AI	QI
(01, 01)	-135	(11, 01)		SRI * AMP	SRQ * AMP	AI * cos(45)	QI * cos(45)
(01, 01)	-90	(01, 11)	(-90°)	SRI * AMP	SRQ * AMP	AI	QI
(01, 01)	-45	(01, 11)		SRI * AMP	SRQ * AMP	AI * cos(45)	QI * cos(45)
(01, 01)	0	(01, 01)	(0°)	SRI * AMP	SRQ * AMP	AI	QI
(01, 01)	+45	(01, 01)		SRI * AMP	SRQ * AMP	AI * cos(45)	QI * cos(45)
(01, 01)	+90	(11, 11)	(+90°)	SRI * AMP	SRQ * AMP	AI	QI
(01, 01)	+135	(11, 11)		SRI * AMP	SRQ * AMP	AI * cos(45)	QI * cos(45)

▼FIG. 4B

INPUT (SRI, SRQ)	OFFSET VALUE	AMPLITUDE MULTIPLICATION (AI,	QI)	45°STEP PROCESSING (RI,	RQ)
(01, 01)	+180	SRI * AMP	SRQ * AMP	AI * cos(180)	QI * sin(180)
(01, 01)	-135	SRI * AMP	SRQ * AMP	AI * cos(-135)	QI * sin(-135)
(01, 01)	-90	SRI * AMP	SRQ * AMP	AI * cos(-90)	QI * sin(-90)
(01, 01)	-45	SRI * AMP	SRQ * AMP	AI * cos(-45)	QI * sin(-45)
(01, 01)	0	SRI * AMP	SRQ * AMP	AI	QI
(01, 01)	+45	SRI * AMP	SRQ * AMP	AI * cos(45)	QI * sin(45)
(01, 01)	+90	SRI * AMP	SRQ * AMP	AI * cos(90)	QI * sin(90)
(01, 01)	+135	SRI * AMP	SRQ * AMP	AI * cos(135)	QI * sin(135)

As can be seen, the prior art requires multiple √2 calculations and associated processing, whereas the claimed invention according to Figure 4A and detailed in Figure 7 requires only a single such √2 calculation.

Therefore, if amplitude multiplication is performed before offset processing in 90° units, as in the Prior Art of Figure 4B, offset processing in 90° units will be performed with respect to a greater volume of information than two bits (18 bits, for example), and the amount of calculation will therefore increase. Thus, by performing amplitude multiplication processing <u>after</u> offset

processing is performed in 90° units, and before offset processing is performed in 45° units, as in the claimed invention shown in the embodiment of Figure 4A and detailed in Figure 7, it is possible to reduce an amount of calculation in comparison to the prior art shown in Figure 4B. Applicant's disclosed prior art and SATO do not disclose any consideration of the amount of processing/calculation, and therefore do not lend to any modification in the manner such that the invention recited in Applicant's claims would be obtained. Such modification is not merely a matter of design choice, and the differences in inputs between the embodiment of Figure 4A and the prior art of Figure 4B have great significance.

Therefore, according to the presently claimed invention, amplitude multiplication processing is performed after offset processing in 90° units, and before performing 45° offset processing, for the reasons described above, and the manner of this processing is not an obvious variation that one of ordinary skill in the art would have been led to by SATO and/or Applicant's disclosed prior art.

At least for these reasons, SATO in view of Applicant's disclosed prior art do not render obvious independent claim 25, which recites, *inter alia*:

> **A phase offset calculator, comprising: a sign inverter that inverts a sign of signed binary data to obtain a first phase offset of a multiple of 90°; an amplitude adjuster that adjusts an amplitude of a signal output from the sign inverter; and a phase offsetter that provides a second phase offset smaller than 90° to a signal output from the amplitude adjuster.**

At least for these reasons, SATO in view of Applicant's disclosed prior art also do not render obvious independent claim 26, which recites, inter alia:

> **A signal point mapper for mapping a QPSK modulation signal in a phase space, comprising: a sign inverter that inverts a sign of the QPSK modulation signal to obtain a first phase offset of a multiple of 90°; an amplitude adjuster that adjusts an amplitude of a signal output from the sign inverter; and a phase offsetter that provides a second phase offset smaller than 90° to a signal output from the amplitude adjuster.**

At least for these reasons, SATO in view of Applicant's disclosed prior art also do not render obvious independent claim 28, which recites, *inter alia*:

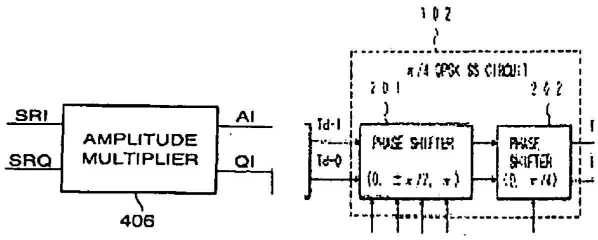
A CDMA transmission apparatus for controlling a phase and amplitude of a transmission signal by closed-loop control, comprising: a signal point mapper having: a sign inverter that inverts a sign of a QPSK modulation signal to obtain a first phase offset of a multiple of 90°; an amplitude adjuster that adjusts an amplitude of a signal output from the sign inverter; and a phase offsetter that calculates a second phase offset smaller than 90° with a signal output from the amplitude adjuster; and a transmission controller that provides control information to the signal point mapper based on a message included in a reception signal from a receiver that receives communication signals from the CDMA transmission apparatus.

At least for these reasons, SATO in view of Applicant's disclosed prior art also do not render obvious independent claim 32, which recites, *inter alia*:

A transmit diversity method that implements closed loop transmit diversity for controlling a phase and amplitude of a transmission signal from a transmitter based on a message from a receiver that receives the transmission signal from the transmitter, comprising: inverting a sign of a QPSK modulation signal to obtain a first phase offset of a multiple of 90°; adjusting an amplitude of the QPSK modulation signal after the sign inversion; and calculating a second phase offset smaller than 90° with the QPSK modulation signal after the amplitude adjusting.

As set forth above, each of independent claims 25, 26, 28 and 32 includes features relating to amplitude adjustment after sign inversion to obtain a first phase offset, and before phase offsetting by a second phase offset smaller than 90°. Benefits of the order in this processing relate to the amount of data required for representing and processing signals, and are not a subject rendered sought in Applicant's disclosed prior art or SATO. Accordingly, there is no reason that one of ordinary skill in the art would modify Applicant's disclosed prior art and SATO to result in Applicant's claims, particularly insofar as Applicant's claims recite features explicitly contrary to Applicant's disclosed prior art and SATO.

As noted in Applicant's previous Response, simple design choice modification of SATO with teachings of Applicant's disclosed prior art would result in a configuration as follows:



That is, elements 201 and 202 of element 102 in SATO (see Figures 1 and 2) are directed only to features of phase control, and not to amplitude adjustment, and are therefore consistent with and analogous to phase offset calculator 407 in Applicant's disclosed prior art. Modification of SATO with Applicant's disclosed prior would result in a configuration as shown above, and not in amplitude adjustment <u>after sign inversion to obtain a first phase offset</u>. Modification of SATO with the disclosed prior art shown in Figure 4B would therefore not result in amplitude adjustment after any aspect of phase control.

Similarly, combination of SATO and Applicant's disclosed prior art would result in <u>phase offset calculator 407 as in Applicant's disclosed prior art being placed before elements 201 and 202 as in SATO</u>. There is simply no teaching in SATO or Applicant's disclosed prior art of phase offsetting occurring before amplitude adjustment, nor any reason provided in SATO or Applicant's disclosed prior art that would lead one of ordinary skill in the art to obtain Applicant's claimed invention. Accordingly, the combination of SATO and Applicant's disclosed prior art does not render obvious the combinations recited in Applicant's independent claims.

Therefore, the rejection of claims 25, 26, 28 and 32 under 35 U.S.C. §103 is improper, at least for each of the reasons set forth above.

Additionally, each of independent claim 28 and independent claim 33 recite features of controlling the second phase offsetting based on a signal from a remote source (in claim 28 "a message included in a reception signal from a receiver that receives communication signals" from the claimed CDMA transmission apparatus). In this regard, claim 28 is reproduced above, and claim 33 recites, *inter alia*:

A phase offsetter, comprising: a sign inverter that inverts a sign of signed binary data to obtain a first phase offset of a multiple of 90°; and a phase shifter that calculates a phase shift to provide the sign-inverted signed binary data a phase offset smaller than 90°, and that provides the sign-inverted signed binary data the phase offset smaller than 90° based on a control signal from a remote source.

There is no feature of SATO or Applicant's disclosed prior art that discloses controlling the second phase offsetting based on a signal from a remote source. Accordingly, the rejection of claims 28 and 33 under 35 U.S.C. §103 does not properly establish that SATO as modified by Applicant's disclosed prior art would result in the combinations of claims 28 and 33, including controlling the second phase offsetting based on a signal from a remote source.

Accordingly, the rejection of claims 28 and 33 under 35 U.S.C. §103 is improper, at least for each of the additional reasons set forth above.

At least for each and all of the reasons set forth above, each of the independent claims now pending is allowable over SATO and/or Applicant's disclosed prior art, whether considered alone or in any proper combination. Further, each of the pending dependent claims is allowable at least for depending, directly or indirectly, from an allowable independent claim, as well as for additional reasons related to their own recitations including those previously set forth in Applicant's previous Responses.

At least for each and all of the reasons set forth above, reconsideration and withdrawal of the outstanding rejections is respectfully requested.

Should there be any questions, any representative of the U.S. Patent and Trademark Office is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,
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